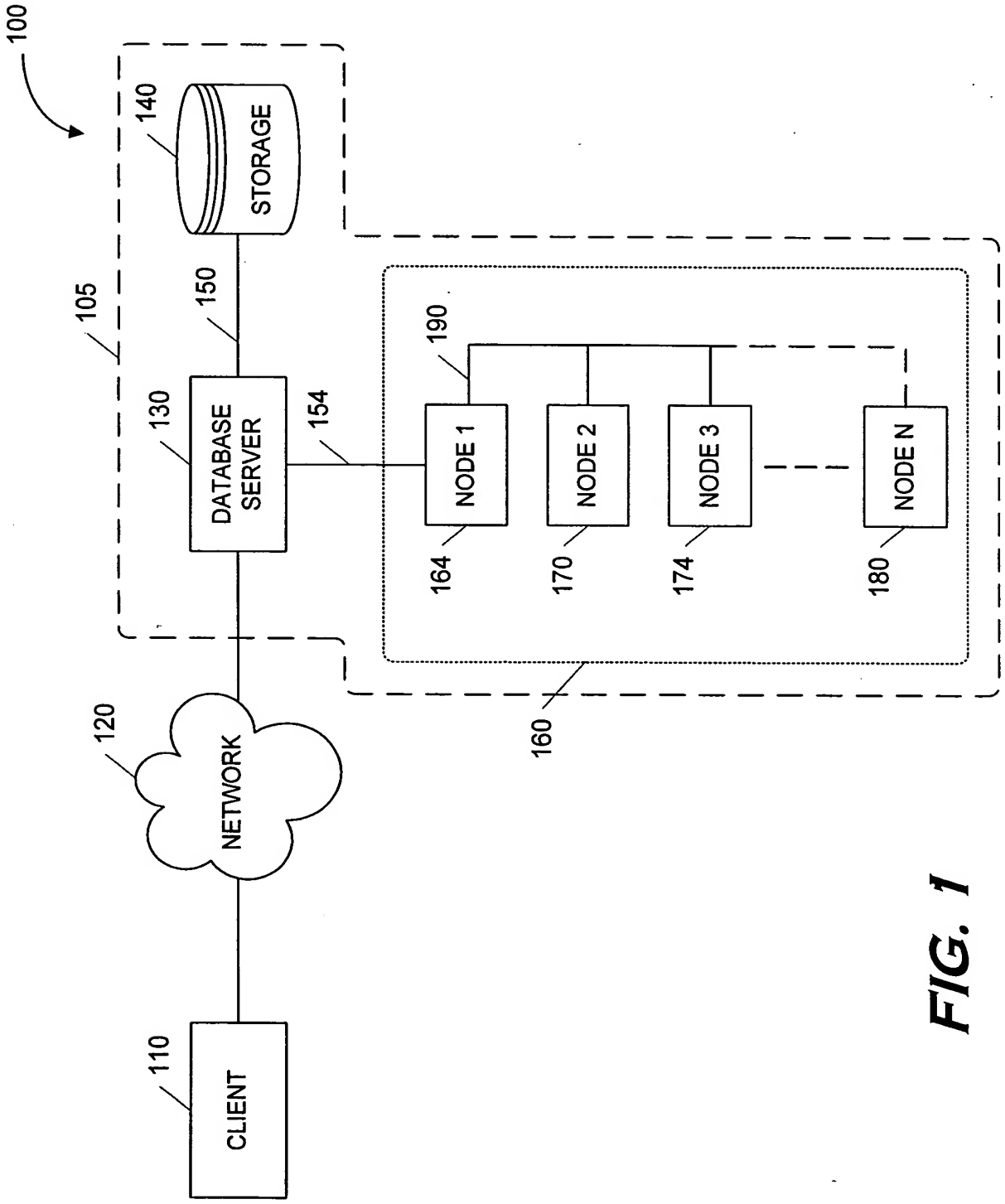
100
140
STORAGE
105
150
190
130
DATABASE SERVER
154
NODE 1
NODE 2
NODE 3
NODE N
164
170
174
180
160
120
NETWORK
110
CLIENT

FIG. 1

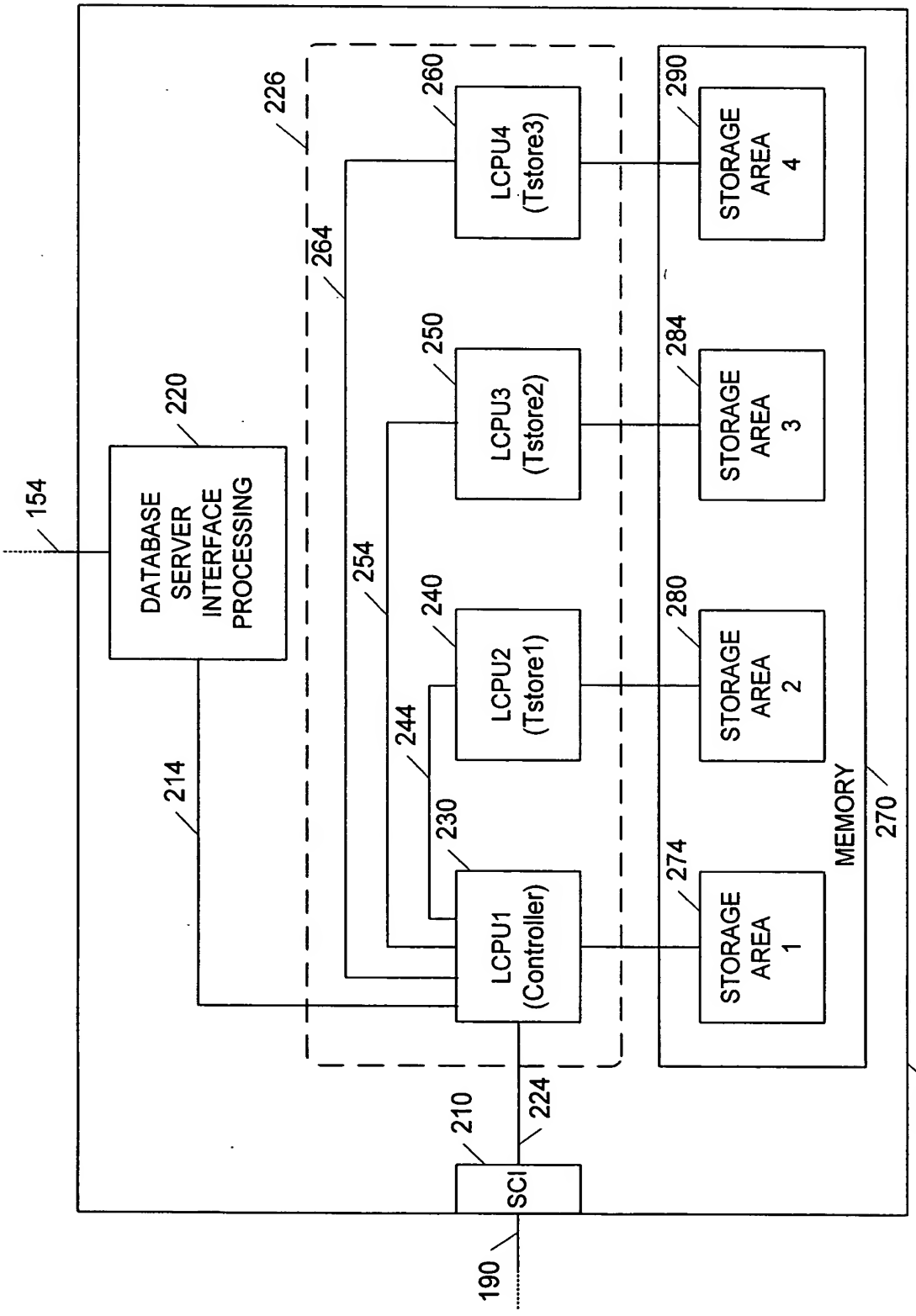
154
DATABASE SERVER INTERFACE PROCESSING
220
214
226
264
254
244
230
LCPU1 (Controller)
LCPU2 (Tstore1)
240
LCPU3 (Tstore2)
250
LCPU4 (Tstore3)
260
STORAGE AREA 1
274
STORAGE AREA 2
280
STORAGE AREA 3
284
STORAGE AREA 4
290
MEMORY
270
164
210
SCI
224
190

FIG. 2

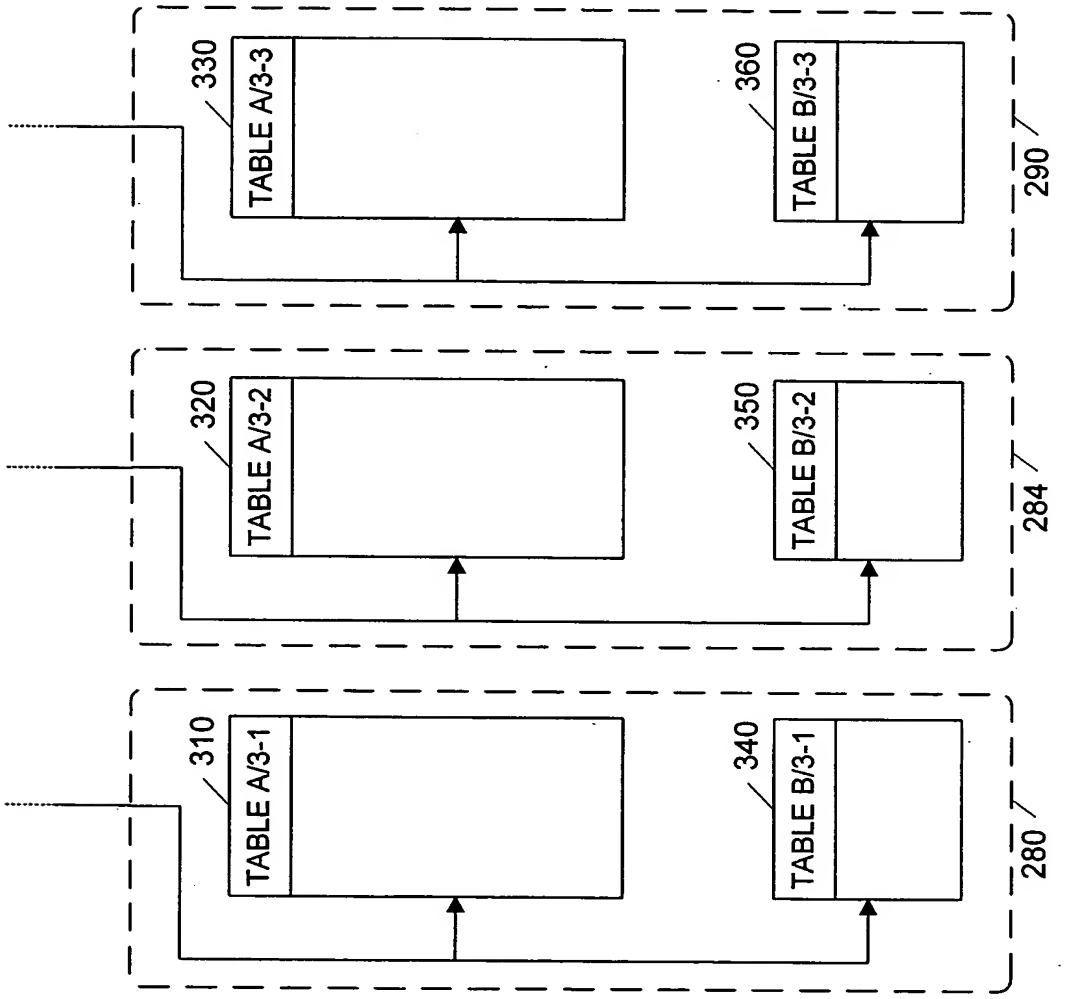
330
TABLE A/3-3
360
TABLE B/3-3
290
320
TABLE A/3-2
350
TABLE B/3-2
284
310
TABLE A/3-1
340
TABLE B/3-1
280

FIG. 3

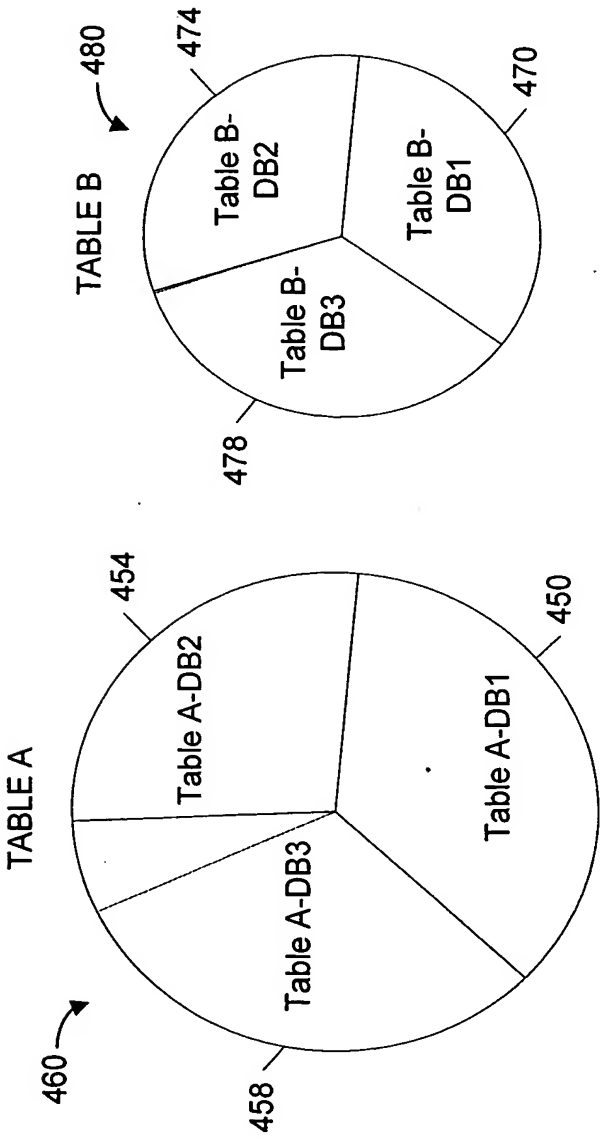
TABLE B
480
474
Table B-DB2
470
Table B-DB1
Table B-DB3
478
TABLE A
454
Table A-DB2
450
Table A-DB1
Table A-DB3
460
458

FIG. 4

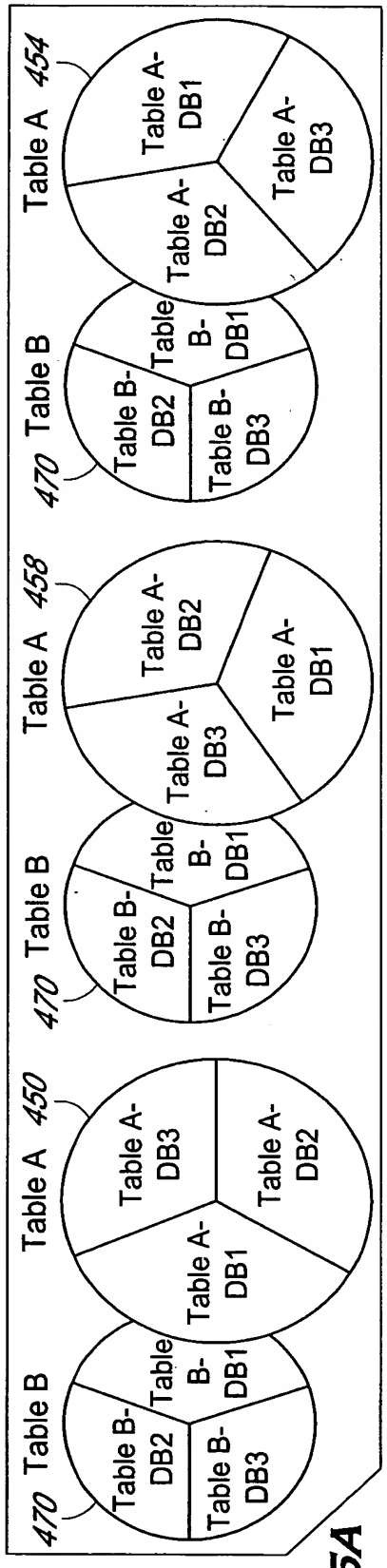

FIG. 5A

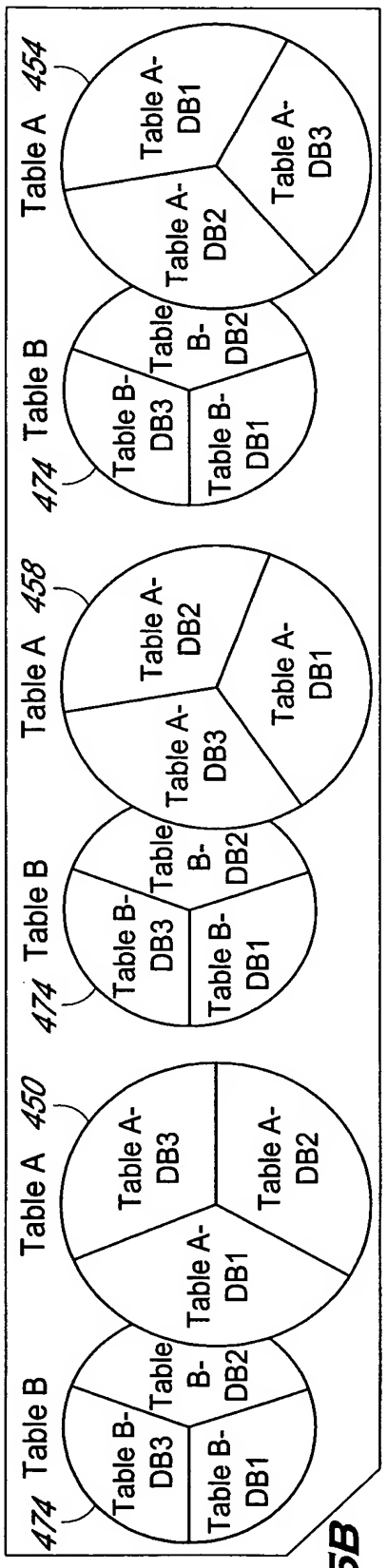

FIG. 5B

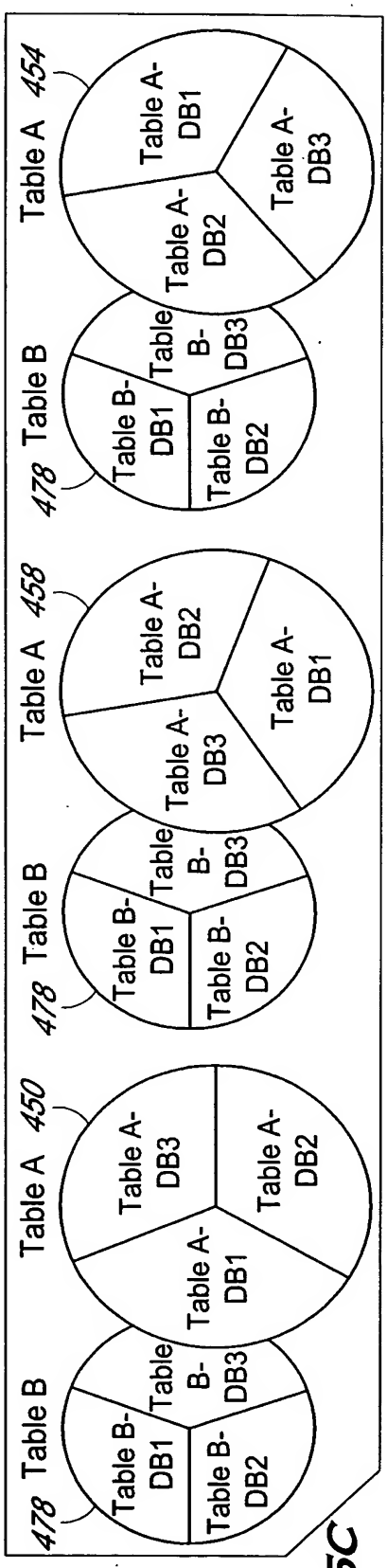

FIG. 5C

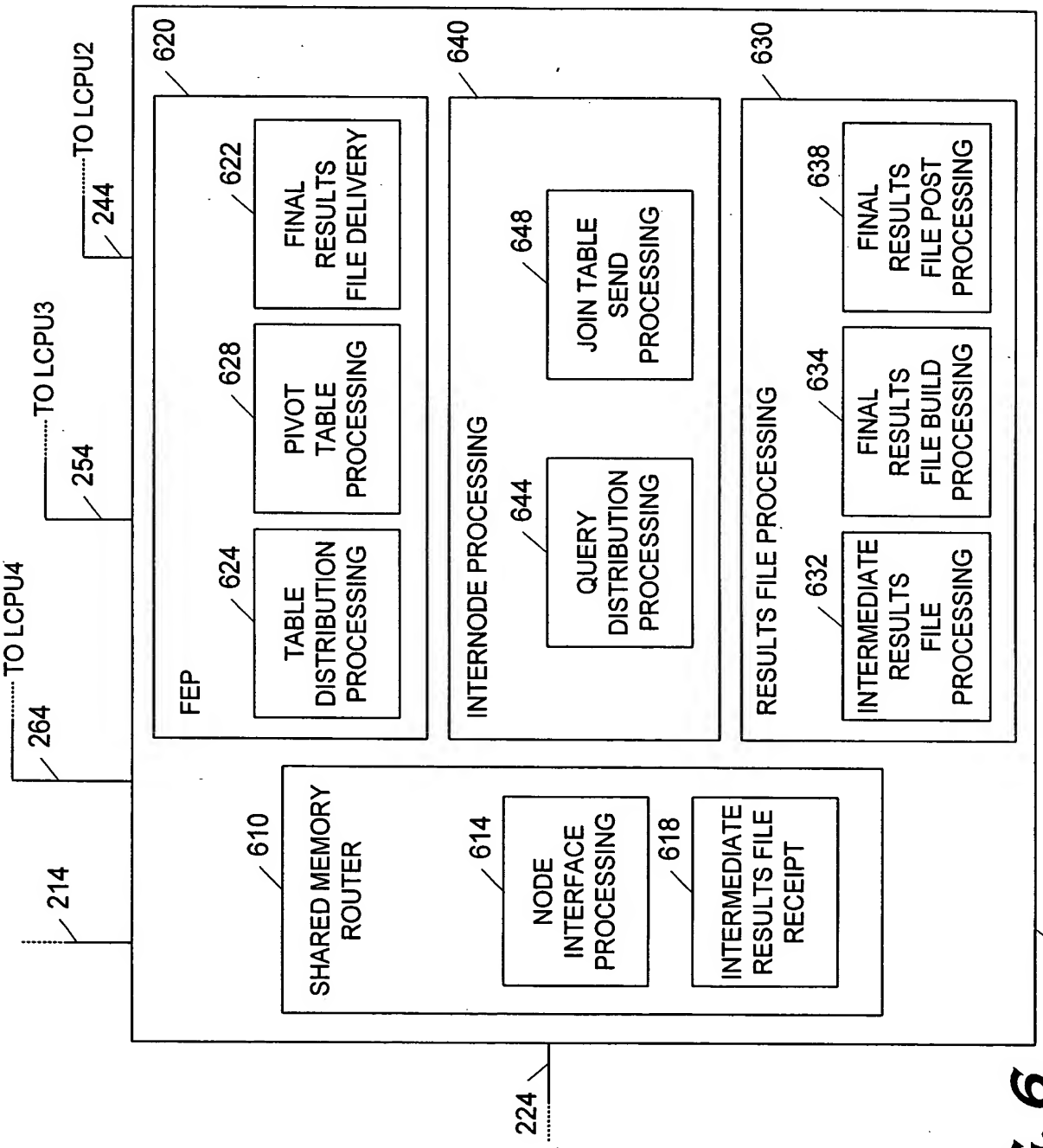
TO LCPU2
244
TO LCPU3
254
TO LCPU4
264
214
224
230
620
FEP
622
FINAL RESULTS FILE DELIVERY
628
PIVOT TABLE PROCESSING
624
TABLE DISTRIBUTION PROCESSING
640
INTERNODE PROCESSING
648
JOIN TABLE SEND PROCESSING
644
QUERY DISTRIBUTION PROCESSING
630
RESULTS FILE PROCESSING
638
FINAL RESULTS FILE POST PROCESSING
634
FINAL RESULTS FILE BUILD PROCESSING
632
INTERMEDIATE RESULTS FILE PROCESSING
610
SHARED MEMORY ROUTER
614
NODE INTERFACE PROCESSING
618
INTERMEDIATE RESULTS FILE RECEIPT

FIG. 6

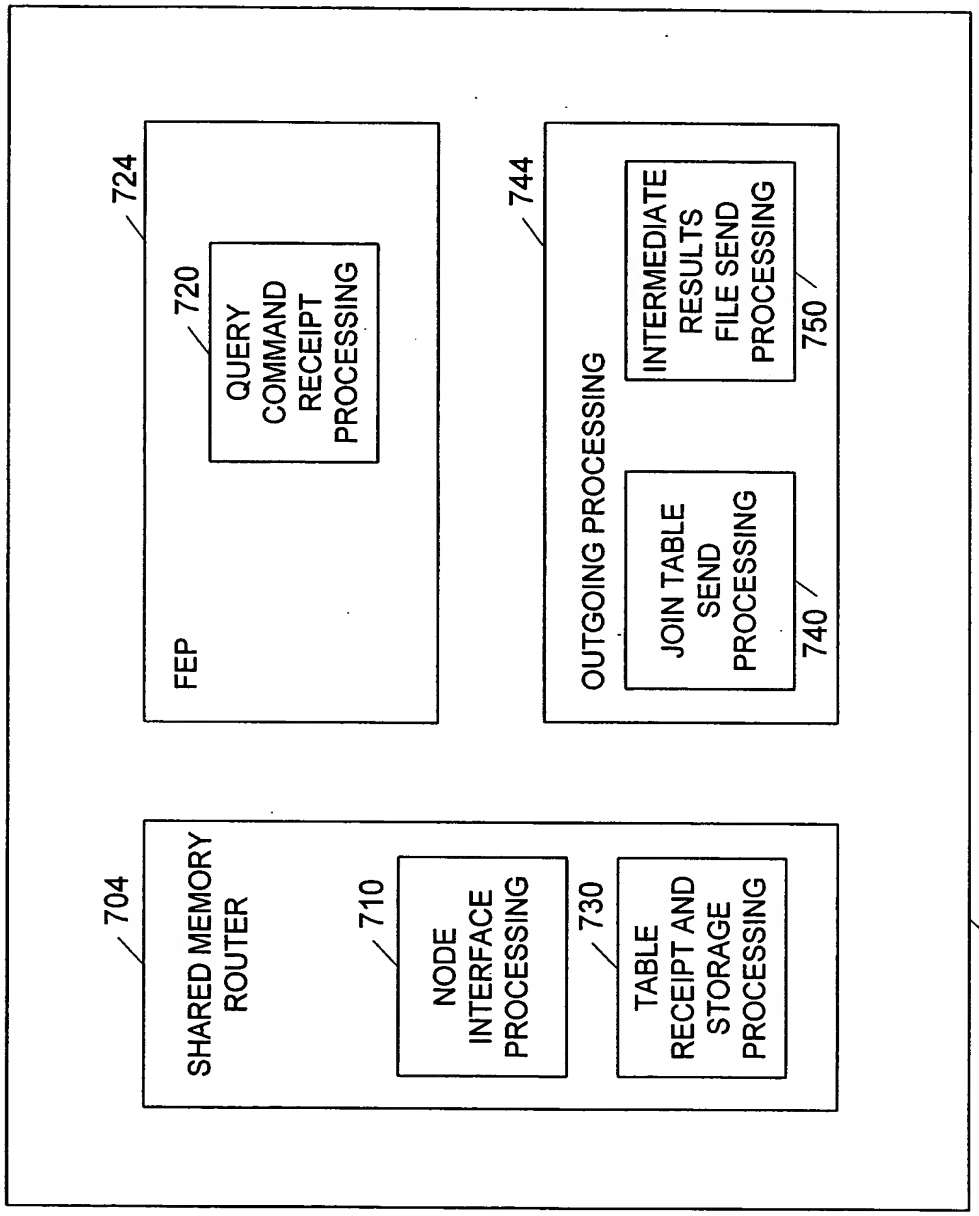
700
704
SHARED MEMORY ROUTER
710
NODE INTERFACE PROCESSING
730
TABLE RECEIPT AND STORAGE PROCESSING
724
FEP
720
QUERY COMMAND RECEIPT PROCESSING
744
OUTGOING PROCESSING
740
JOIN TABLE SEND PROCESSING
750
INTERMEDIATE RESULTS FILE SEND PROCESSING

FIG. 7

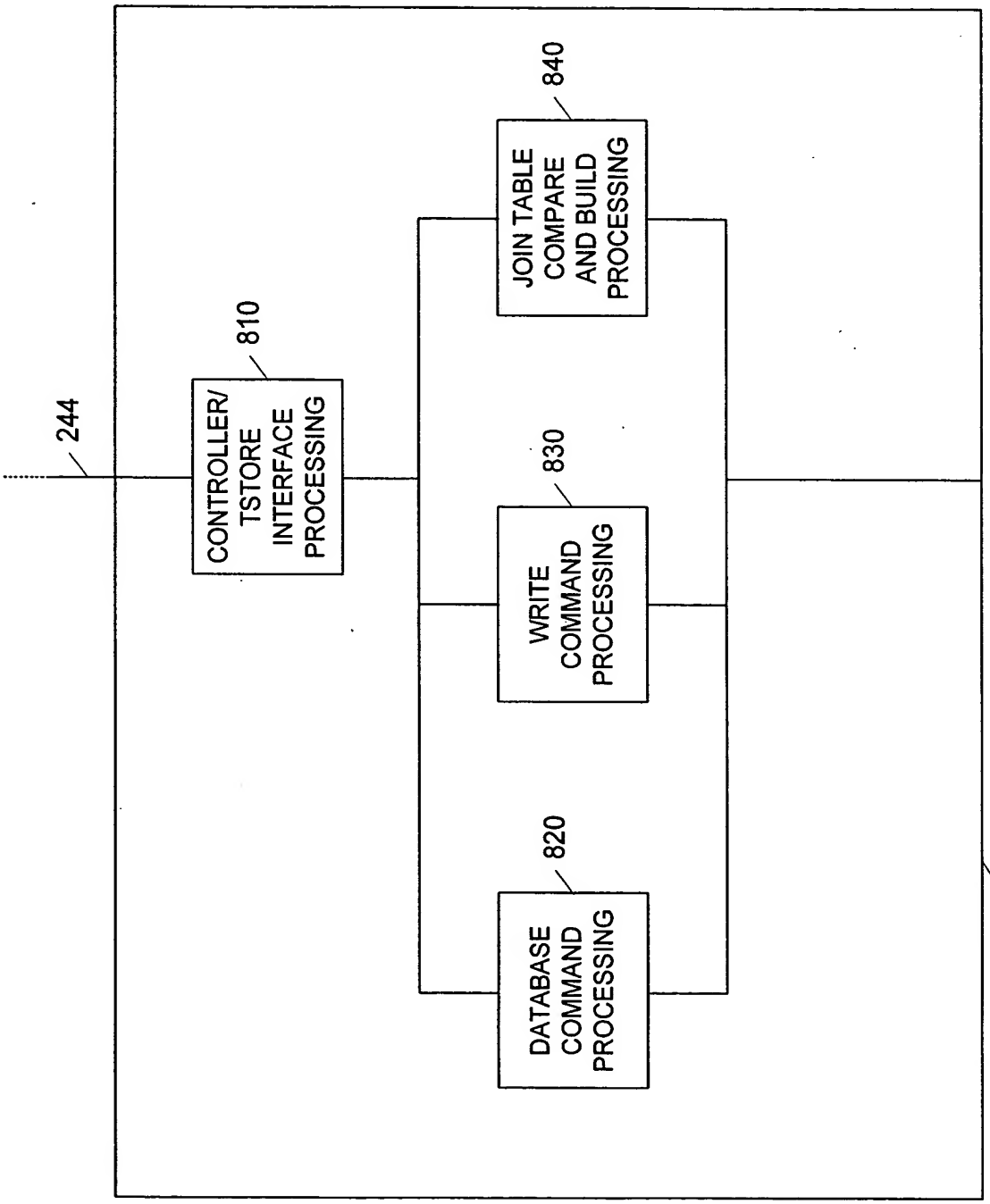
244
CONTROLLER/ TSTORE INTERFACE PROCESSING
810
JOIN TABLE COMPARE AND BUILD PROCESSING
840
WRITE COMMAND PROCESSING
830
DATABASE COMMAND PROCESSING
820
240

FIG. 8

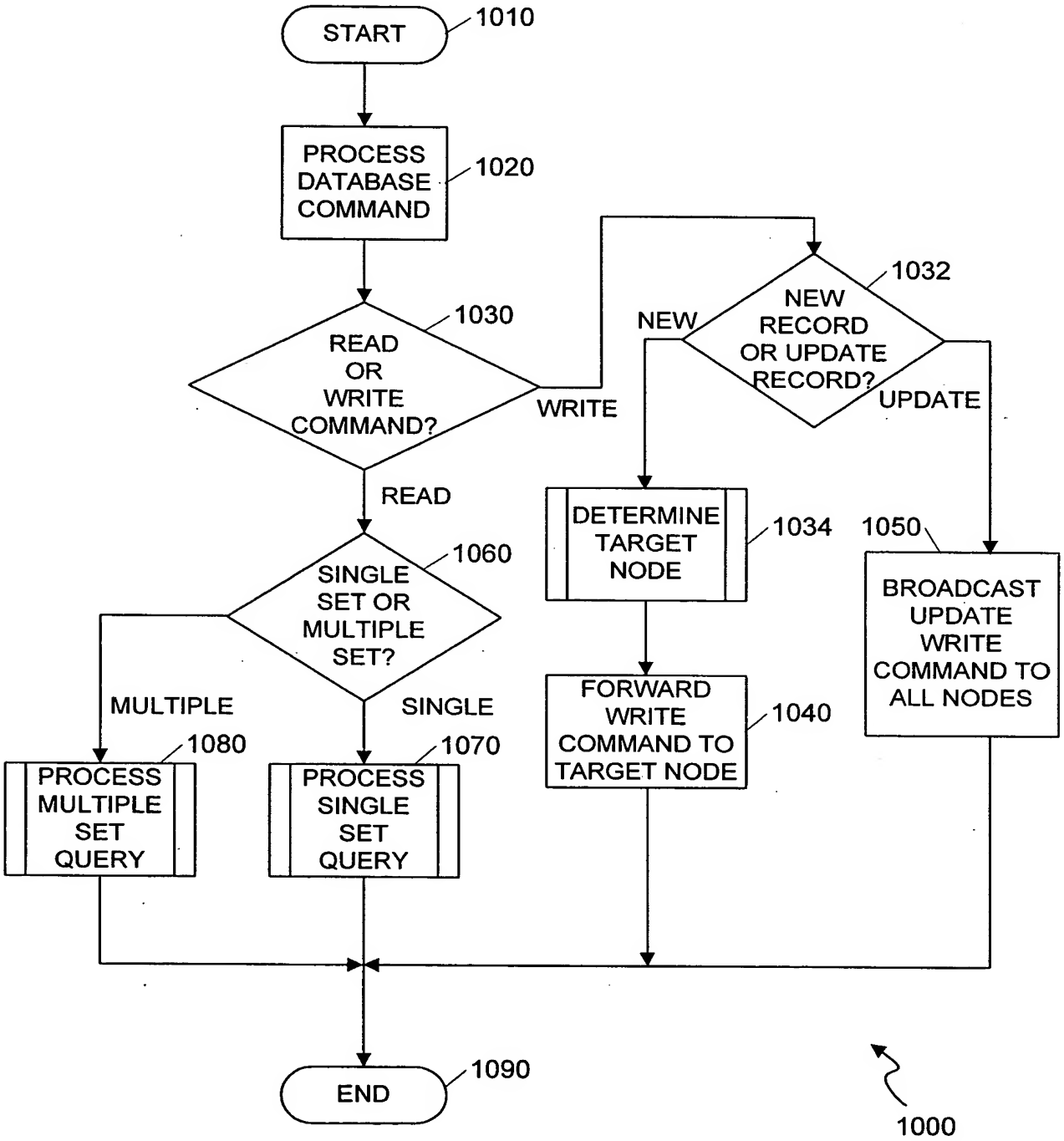
START
1010
PROCESS DATABASE COMMAND
1020
READ OR WRITE COMMAND?
1030
WRITE
READ
NEW RECORD OR UPDATE RECORD?
1032
NEW
UPDATE
DETERMINE TARGET NODE
1034
FORWARD WRITE COMMAND TO TARGET NODE
1040
BROADCAST UPDATE WRITE COMMAND TO ALL NODES
1050
SINGLE SET OR MULTIPLE SET?
1060
MULTIPLE
SINGLE
PROCESS MULTIPLE SET QUERY
1080
PROCESS SINGLE SET QUERY
1070
END
1090
1000

FIG. 9

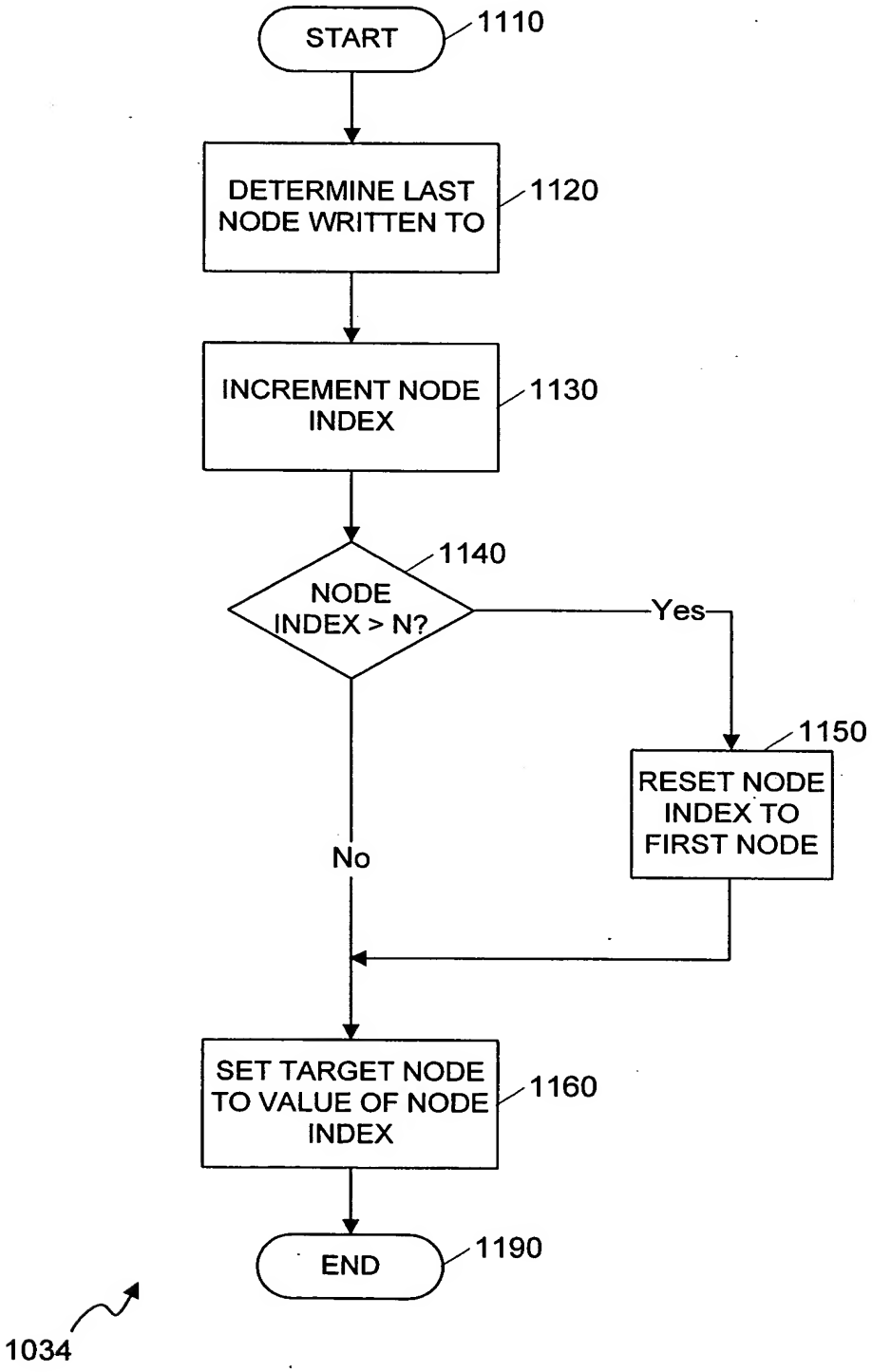
START
1110
DETERMINE LAST NODE WRITTEN TO
1120
INCREMENT NODE INDEX
1130
NODE INDEX > N?
1140
Yes
No
RESET NODE INDEX TO FIRST NODE
1150
SET TARGET NODE TO VALUE OF NODE INDEX
1160
END
1190
1034

FIG. 10

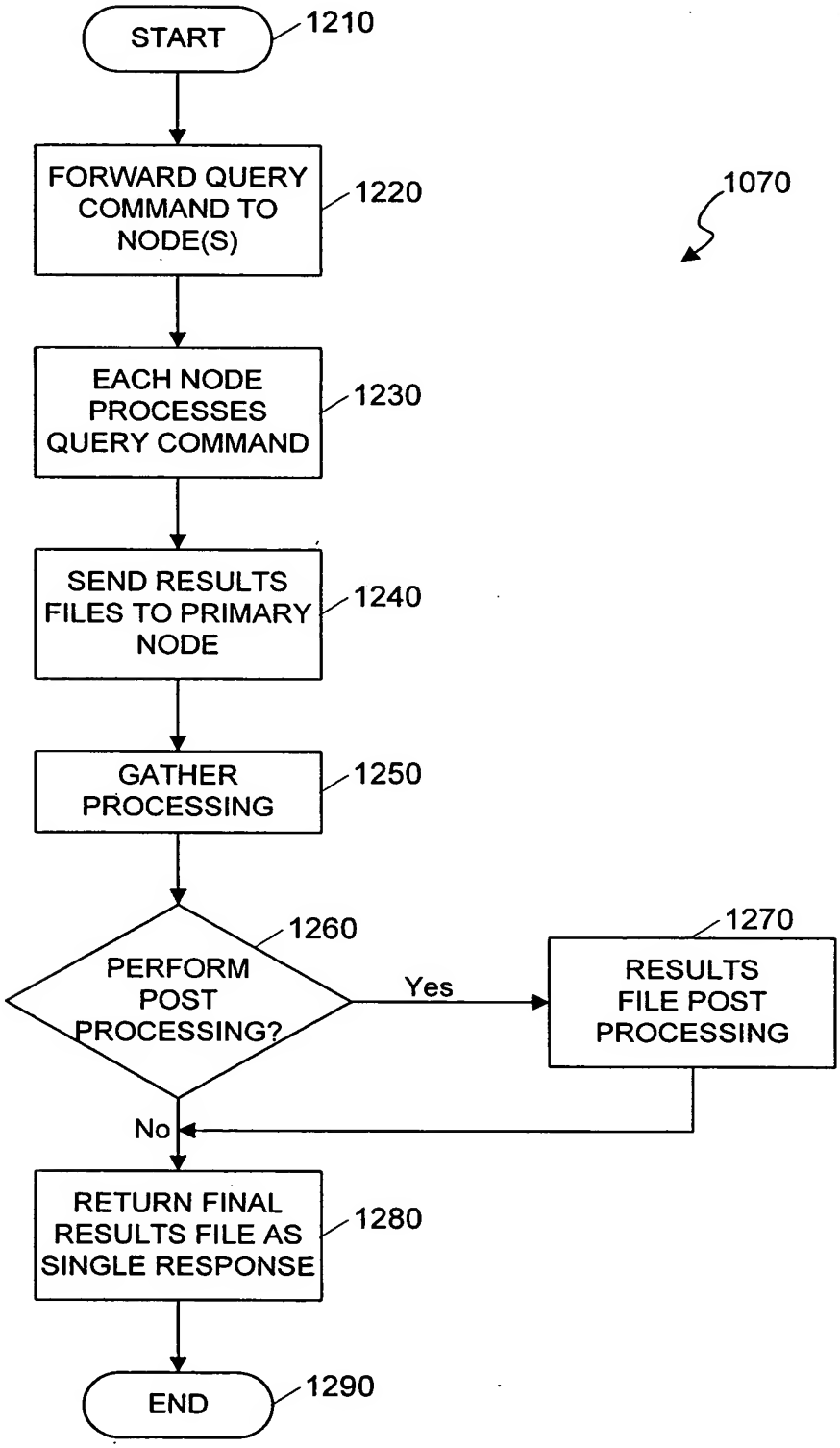
START
1210
FORWARD QUERY COMMAND TO NODE(S)
1220
1070
EACH NODE PROCESSES QUERY COMMAND
1230
SEND RESULTS FILES TO PRIMARY NODE
1240
GATHER PROCESSING
1250
PERFORM POST PROCESSING?
1260
Yes
RESULTS FILE POST PROCESSING
1270
No
RETURN FINAL RESULTS FILE AS SINGLE RESPONSE
1280
END
1290

FIG. 11

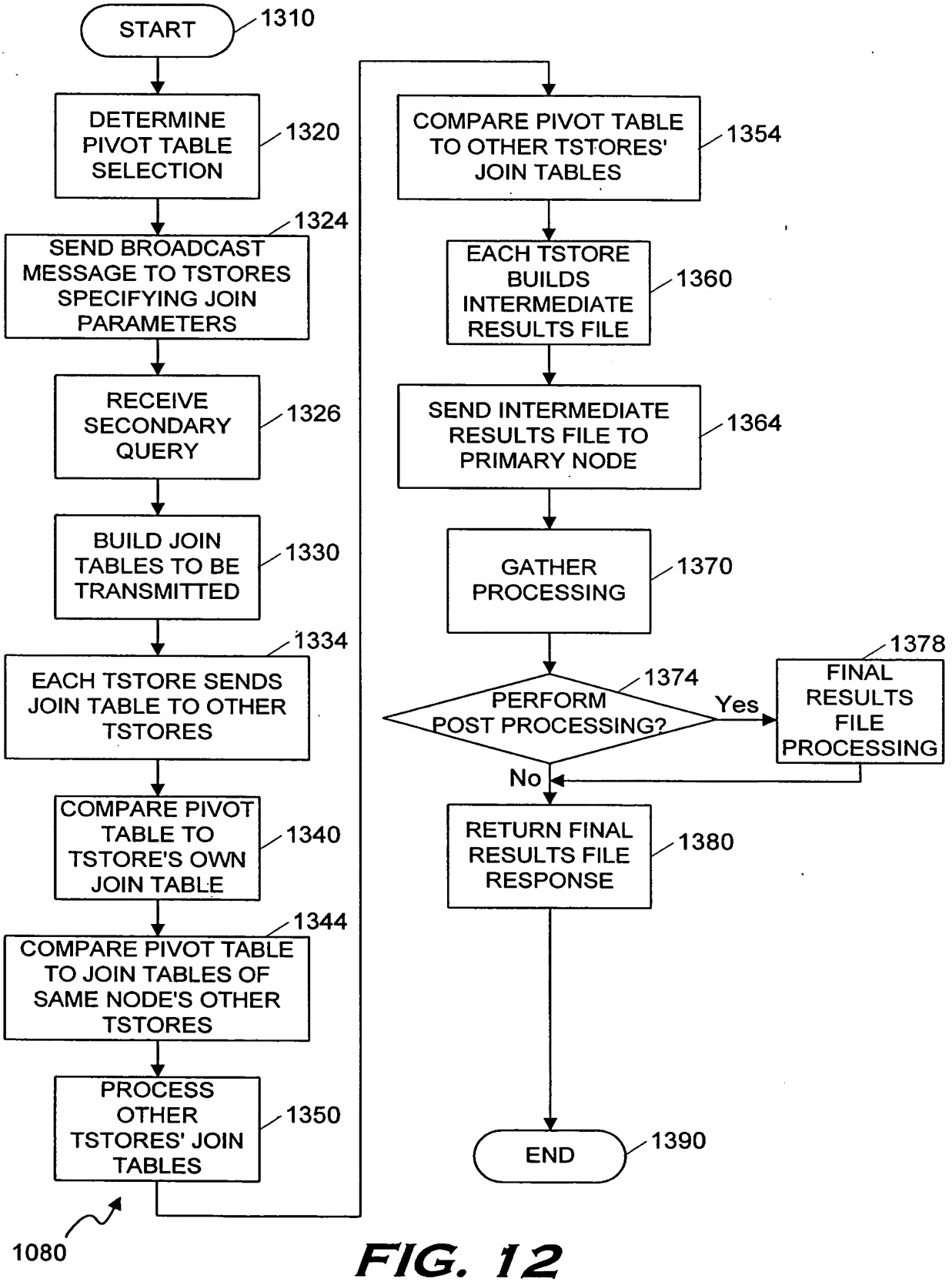
START
1310
DETERMINE PIVOT TABLE SELECTION
1320
SEND BROADCAST MESSAGE TO TSTORES SPECIFYING JOIN PARAMETERS
1324
RECEIVE SECONDARY QUERY
1326
BUILD JOIN TABLES TO BE TRANSMITTED
1330
EACH TSTORE SENDS JOIN TABLE TO OTHER TSTORES
1334
COMPARE PIVOT TABLE TO TSTORE'S OWN JOIN TABLE
1340
COMPARE PIVOT TABLE TO JOIN TABLES OF SAME NODE'S OTHER TSTORES
1344
PROCESS OTHER TSTORES' JOIN TABLES
1350
1080
COMPARE PIVOT TABLE TO OTHER TSTORES' JOIN TABLES
1354
EACH TSTORE BUILDS INTERMEDIATE RESULTS FILE
1360
SEND INTERMEDIATE RESULTS FILE TO PRIMARY NODE
1364
GATHER PROCESSING
1370
PERFORM POST PROCESSING?
1374
Yes
FINAL RESULTS FILE PROCESSING
1378
No
RETURN FINAL RESULTS FILE RESPONSE
1380
END
1390

FIG. 12

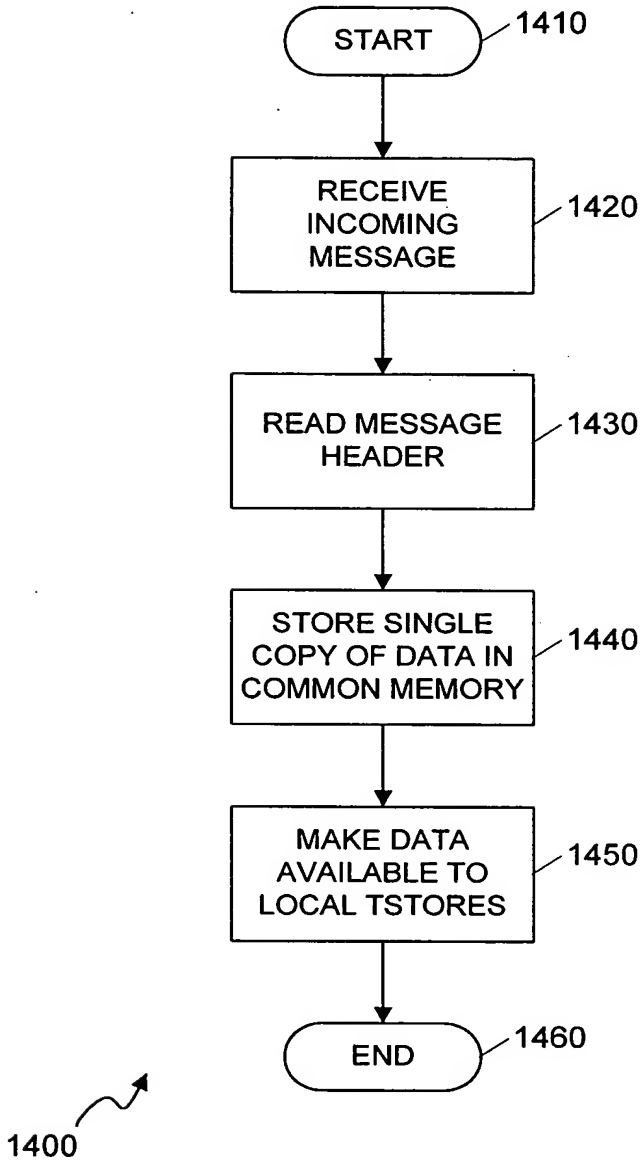
START
1410
RECEIVE INCOMING MESSAGE
1420
READ MESSAGE HEADER
1430
STORE SINGLE COPY OF DATA IN COMMON MEMORY
1440
MAKE DATA AVAILABLE TO LOCAL TSTORES
1450
END
1460
1400

FIG. 13